

# REMARKS ON THE HORNS AND ON THE SYSTEMATIC POSITION OF THE AMERICAN ANTELOPE.

---

By MARCUS WARD LYON, Jr.

*Assistant Curator, Division of Mammals, U. S. National Museum.*

---

## INTRODUCTION.

The writing of these notes was prompted originally by the inquiries of correspondents regarding the deciduous character of the horns of the American Antelope, and later by the finding of a very curious Antelope horn in the collection in the U. S. National Museum (Plate XXXIX). In addition to giving a brief description of the horns of this animal, and the manner in which they are annually shed and renewed, I have taken this opportunity to make a few remarks upon the abnormal horn just mentioned and a somewhat similar case observed on a living specimen in London a few years ago, as well as to discuss briefly the systematic position of the American Antelope. These notes contain no new data as to the shedding of the horns of the Antelope. I have drawn freely from the literature on that point. The sources are clearly indicated in the footnotes and in the bibliography at the end of the article.

## HISTORICAL.

Curiously enough the first printed statement regarding the shedding of the horns of the American Antelope was a denial by Audubon and Bachman <sup>a</sup> that such an occurrence could take place. It was reported to them by hunters at Fort Union, <sup>b</sup> that the Antelope dropped its horns and renewed them every year, somewhat after the manner of deer. Such a phenomenon was so unusual in the group of animals to which the American Antelope evidently belonged that the naturalists, regarding the belief as erroneous, took special pains to deny it.

Two other American naturalists <sup>c</sup> of note also denied the possibility of the Antelope shedding its horns, and that at a time subse-

---

<sup>a</sup> Viviparous Quadrupeds of North America, II, 1851, p. 189.

<sup>b</sup> Now Fort Buford, North Dakota.

<sup>c</sup> Coes, American Naturalist, I, 1868, p. 539. Cope, American Naturalist, XII, 1878, p. 557; XXII, 1888, p. 1081.

quent to the appearance of reliable printed statements concerning the true facts of the case.

The second mention of this peculiarity of the American Antelope was made in 1858, in Cassin's Report of the United States Exploring Expedition. Little attention seems to have been paid, however, to the brief observations <sup>a</sup> published there.

The first accurate observations on the annual shedding of the horns of the American Antelope were published in 1865.<sup>b</sup> They were made on a specimen living in the gardens of the London Zoological Society. Several years before, however, in 1858, Dr. C. A. Canfield, of Monterey, California, had made very careful observations on the deciduous character of the horns, as shown in wild and semidomesticated animals. His notes were set forth at considerable length in a letter addressed to Prof. S. F. Baird, Secretary of the Smithsonian Institution. That any Antelope annually shed and renewed its horns appeared so improbable that the truth of the contents of Doctor Canfield's letter was evidently doubted, for it was not published until after the appearance of the observations made on the living specimen in London. In the following year, 1866, this letter was published in the proceedings of the London Zoological Society.<sup>c</sup>

Since then many articles on the subject have appeared in various publications. (See Bibliography.)

#### DESCRIPTION OF THE GROWTH AND SHEDDING OF THE HORNS.

The growth and shedding of the horns in males may be briefly outlined as follows: The kids are born during the spring and are of course at that time hornless. By the middle of summer the first horns begin to appear, being small and conical and concealed in the hair of the forehead. They reach a length of nearly an inch by autumn. Early in the winter they drop off, leaving small knobs projecting from the frontal region about a half inch long and covered with hairs. Inside of a week these knobs are again covered with a small cap of horn. This horn increases in size from the base, for a year, attaining a length of nearly six inches. The characteristic prong is not present at this age. In the early winter these horns drop off, leaving horn-cores about an inch and a half in length, covered, as in the first year, with a hairy skin. Horns immediately form on their tips, and in addition, at the base and in front of the horn-core, another point of horn forms, which becomes the prong. By a gradual conversion of the epidermis of the skin covering the horn-core into

<sup>a</sup> Doctor Marsh in Pickering's notes in Cassin's U. S. Explor. Exped., Mamm., Ornith., 1858, p. 63.

<sup>b</sup> A. D. Bartlett, Proc. Zool. Soc. London, 1865, pp. 718-725, figs. 1-4.

<sup>c</sup> C. A. Canfield, Proc. Zool. Soc. London, 1866, pp. 105-110.

horn, the horny tip at the apex of the core and the horny tip of the prong are consolidated into one solid horn. This process is repeated annually, the successive horns gradually becoming larger, until the maximum size is reached, which takes about five years. The fully mature horn has a strongly recurved and somewhat incurved tip and bears a well-developed prong in front. A fully developed horn is shown on Plate XXXVIII, fig. 5. In that specimen the tendency of the tip to twist backward and inward has been carried to such an extent that the apex has almost made a complete circle and is there directed forward, the horn being abnormal in this respect. There is no process of the bony horn-core for support of the prong in front nor under the extremity of the horn, both the prong and the curving apex being solid material. The core, however, is distinctly widened or marked by a very obtuse angle, corresponding to the position of the prong over it. The new horn, immediately after the old one has been cast, is very small and rests as a cap upon the tip of the blade-like bony horn-core. (Plate XXXVIII, fig. 3.) The remainder of the horn-core is covered with skin bearing long coarse hairs. The epidermis gradually develops into horn from above downward. The prong begins to form before the epidermis between the tip of the horn and the prong has been converted into horn. (See Plate XXXVIII, fig. 4, where some epidermis which is being converted into horn and some long hairs may be seen between the prong and the tip of the horn above.)

The time of year in which the horns are shed is the autumn or early winter. Old bucks drop theirs earlier than do younger animals, that is, the oldest individuals cast their horns in the month of October, while younger individuals cast theirs in December or the early part of January.

The mechanical factor in the dropping off of the horns appears to be the rapid development of a new horn on the top of the horn-core and beneath the old horn which is about to be shed. This newly growing horn pushes the old one upward, loosening it from the horn-core to which it has been attached by the continuity of its substance with that of the horny layer of the skin covering the core.<sup>a</sup> It is also apparently held in position by numerous long hairs which have their roots in the skin covering the core, while many of their apices penetrate into the substance of the horn. All observers say that when the horn is cast off its interior is lined with many long hairs, which were evidently pulled out from the skin covering the horn-core. On the other hand, the skin covering the core still possesses many long hairs whose apices once penetrated into the substance of the horn which has been pulled away from them. In the autumn of the year

<sup>a</sup> Caton, *The Antelope and Deer of America*, 1877, p. 32, figs. 1 and 2.

the horns of the Antelope are always loosely attached to the bony core, and can be pulled off with little effort. The line of demarcation between the base of the horn and the surrounding skin at that time is well marked. In the earlier part of the year the horny substance at the base of the horn insensibly passes into the structure of the adjoining skin.

Direct observations as to the growth and replacement of the horns of the female Antelope are lacking, but the process is probably not essentially different from that observed in the males. A horn and horn core of a female are shown in Plate XXXVIII, figs. 1 and 2.

Common as is the American Antelope and as well developed the art of photography, I have been unable to find any published photographs of an Antelope showing clearly the fully adult horn, the horn immediately after shedding, and its gradual development. Reproductions from pen-and-ink drawings of animals just after the shedding of the horn and its appearance a few weeks later have been published.<sup>a</sup>

#### ABNORMAL HORNS.

Plate XXXIX shows the skull of an American Antelope with a "shed" horn that has not been cast off. It is loose on the new but well-developed horn beneath it, but firmly attached, so that it can not be removed without injury to the specimen. Both the new and the old horns have well-developed prongs. On the right side the old horn had been cast off. The horns in this specimen are abnormal in that both are bent decidedly forward. Examination of the skull shows no apparent cause for this malformation, nor is it evident why the old horn should not have been cast off.

A most interesting instance of the retention of each year's growth of horn has recently been published and illustrated by Mr. R. I. Pocock.<sup>b</sup> In this case the horn curved forward, downward, and backward, making almost a complete circle when seen from the side. Six successive annual growths of horn were quite firmly united with one another. None of them showed a prong. This animal had been castrated when young, and to this fact Mr. Pocock attributed the anomaly. Mr. W. M. Hinman,<sup>c</sup> who had a young castrated Antelope in captivity for a short time, makes no mention of any peculiarity of its horns. His specimen, however, met with an untimely death, perhaps before the anomalous horns had had time to manifest themselves.

---

<sup>a</sup> Bartlett, *Proc. Zool. Soc. London*, 1865, pp. 718-725, figs. 1 and 2. Hays, *American Naturalist*, II, 1868-69, pp. 131-133, four text figs., and pl. III. Forbes, *Proc. Zool. Soc. London*, 1880, pp. 540-543, figs. 1-3.

<sup>b</sup> *Proc. Zool. Soc. London*, 1905, I, pp. 191-197, figs. 28 and 29.

<sup>c</sup> *American Naturalist*, II, 1869, pp. 659-670.

## SYSTEMATIC POSITION OF THE AMERICAN ANTELOPE.

Nearly all systematists have united in placing the American Antelope, *Antilocapra americana* (Ord), in a separate monotypic family, Antilocapridæ, distinct from the other Ruminants, on the ground that it combines in a measure the characters of deer (Cervidæ) and of oxen, sheep, goats, and true antelopes (Bovidæ). In support of this, it is pointed out that its horns are branched and shed annually, both characters of deer, but that it is also a hollow-horned ruminant like cattle, etc. To one who gives the matter consideration, it becomes clear that there is no resemblance between the horns of the Antelope and the so-called horns, or antlers, of the deer, and there is every resemblance structurally and physiologically between the Antelope's horns and those of the Bovidæ.

The antlers of the deer are branched processes of the frontal bone, shed and renewed annually. Each antler is supported on a distinct and permanent outgrowth of the frontal bone known as the pedicle. The base of the antler where it is attached to the pedicle is marked by an outgrowth or ring of bone known as the burr. When the antler is about to be shed, the bone at the junction of the antler with the pedicle is absorbed and the antler falls off. The skin which permanently covers the pedicle immediately grows up over the upper surface of it. From the top of the pedicle the new antler grows out, being always covered with the growing skin from the pedicle. This skin is very vascular and covered with velvety hair. The growing antler itself is very vascular in its interior so that the bone of which the antler is composed is rapidly formed. When the antler reaches maturity, the blood supply to the skin covering it is gradually diminished so that it dries up and eventually peels off, leaving the naked bone of the mature antler exposed. The development of the burr at the base of the antler probably assists in cutting off the supply of blood to the velvet of the antler. The blood supply to the antler itself in the interior is gradually diminished, so that by the time the antler is to be shed it has become practically so much dead bone.

In the Bovidæ, and in the American Antelope as well, the horn is an epidermal outgrowth of definite material known as horn supported by a well-developed process of the frontal bone beneath it known as the horn-core. This latter is permanent, never cast off, and is simple and unbranched, but conforming more or less to the shape of the horn which it supports. The horn proper, the epidermal outgrowth, is added to annually. In the typical Bovidæ the annual increment is not cast off and can be seen at the base of the horn in the form of the well-known annual rings. In the Antelope the annual increment is cast off each succeeding year and no



annual rings of growth are seen at the base of the horn, so that, as Doctor Canfield <sup>a</sup> intimated it might have been suspected that the American Antelope did shed its horns merely by an examination of those structures. The horn of the Antelope can not be said to branch in the sense of the branching of the antlers of the deer. The prong in front is merely a modification of the shape of the horn substance proper and can not be considered as morphologically different from the various ridges and twists that occur on the horns of many of the typical Bovidæ.

That each year's successive growth of horn may not be shed in the Antelope as an abnormal process is beautifully shown in Mr. Pocock's specimen, mentioned above, and to a less extent by the specimen illustrated on Plate XXXIX. If the branching and shedding of the horns are regarded as the main family characters, then the castrated buck in the possession of the London Zoological Society possessed none of them. That the typical Bovidæ may as an abnormal event cast a horn in a manner entirely similar to that of the Antelope is shown in the case described by Grill <sup>b</sup> of a cow casting its horn, without traumatism.

The placing of the genus *Antilocapra* as the sole representative of a family, Antilocapridæ, on an equality with the Cervidæ and the Bovidæ is unnatural, as was pointed out by Cope <sup>c</sup> long ago. The visceral anatomy, the osteology, and the dentition, as shown by Dr. James Murie, <sup>d</sup> associate *Antilocapra* with the Bovidæ. The only essential difference between *Antilocapra* and the other Bovidæ is the casting off of the annual increment of its horn. I see no reason on this account for its separation as a distinct family of the Artiodactyla. Its true position is clearly no more than an aberrant subfamily, Antilocaprinæ, of the Bovidæ as the latter are at present understood, the essential characters of the subfamily being horns deciduous, with a characteristic branch or prong in front, and absence of annual rings of growth at base of horn. In addition to these plainly seen characteristics may be mentioned the large number of cutaneous glands possessed by the American Antelope, <sup>e</sup> 1 postmandibular, 1 ischial, 2 interdigital, 1 hoek, present as pairs, and a median gland on the lower back, above the white patch of the rump. Neither cerumen or lachrymal gland, nor inguinal glands are present, though often found in other Bovidæ. The ischial glands and the one on the lower back are not found on any of the other Bovidæ, so far as I am aware. Doctor Murie has shown that the hair of the American

---

<sup>a</sup> Proc. Zool. Soc. London, 1866, pp. 105-110.

<sup>b</sup> Der zoologische Garten, IV, 1863, pp. 254 and 255.

<sup>c</sup> American Naturalist, XXI, 1888, p. 1081.

<sup>d</sup> Proc. Zool. Soc. London, 1870, pp. 334-368.

<sup>e</sup> Proc. Zool. Soc. London, 1870, p. 340; 1866, p. 106.

Antelope as compared with the hair of the other ruminants is peculiar in possessing markedly denticulate cells in the medulla.<sup>a</sup> When the osteology of the Bovidae is better known, it is probable that the American Antelope will be found to possess certain peculiarities of structure not found elsewhere in the family, but, so far as our present knowledge goes, it has no peculiarities that are not found to a greater or less extent in other members of the family.

## BIBLIOGRAPHY.

The following list contains the references to the original articles on the subject of the annual shedding of the horns of the American Antelope that have come to my notice:

1851. AUDUBON, J. J. and BACHMAN, J.—[Remarks on the supposed shedding of the horns of the Antelopes.]

Viviparous Quadrupeds of North America, II, p. 189.

The authors deny the possibility of the horns being shed.

1858. CASSIN, JOHN.—[Doctor Marsh's observation on the horns of the Antelope.]

United States Exploring Expedition, Mammalogy and Ornithology, p. 63.

Cassin gives this quotation from the notes of Dr. Charles Pickering: "Doctor Marsh assures me that the horns of this animal are shed annually like those of the deer."

1863. WEINLAND, D. F.—[Editorial note.]

Der zoologische Garten, IV, p. 225.

On the casting of a cow's horn by natural causes mentions a like case observed in the American Antelope.

1864. MARTIN, L.—Die Hornbildung bei der Mazama-Antelope.

Der zoologische Garten, V, 1864, pp. 254-256.

Describes the structure of the growing horn, but evidently not aware of its annual shedding.

1865. BARTLETT, A. D.—Remarks upon the affinities of the Prongbuck (*Antilocapra americana*).

Proc. Zool. Soc. London, 1865, pp. 718-725, figs. 1-4.

Describes the actual shedding of the horns of a living specimen in the possession of the London Zoological Society.

1866. CANFIELD, COLBERT A.—On the habits of the Prongbuck (*Antilocapra americana*) and the periodical shedding of its horns. Publication of a letter written at Monterey, California, September 10, 1858, addressed to S. F. Baird, Secretary, Smithsonian Institution.

Proc. Zool. Soc. London, 1866, pp. 105-110.

A very complete and careful account of the growth and annual shedding of the horns of the American Antelope.

1869. HAYS, W. J.—The Prong-horn Antelope.

American Naturalist, II, pp. 131-133, four figures on page 132, and figs. 1 and 2 on Plate 3.

A careful account based on four years' observations of a living specimen, with illustrations of mature and newly formed horns.

<sup>a</sup> Proc. Zool. Soc. London, 1870, pp. 340-342, fig. 1, p. 341.

1869. COOPER, J. G.—The fauna of Montana Territory.

American Naturalist, II, p. 537.

A brief note stating with reasons "There seems to be some foundation for the belief that the horns of these Antelopes are deciduous."

1869. HINMAN, W. M.—Shedding of the horns of the American Antelope (*Antilocapra americana*).

American Naturalist, II, pp. 659-670.

"Communicated in a letter received by the Smithsonian Institution, Washington, D. C." A careful account of the annual shedding and the growth of the horns.

1876. CATON, JOHN DEAN.—The American Antelope or Prong Buck.

American Naturalist, X, pp. 193-205, figs. 10 and 11 and a reprint of Hay's figures in the American Naturalist, II, pp. 131-133.

A careful and detailed account of the shedding and growth of the horns.

1877. CATON, JOHN DEAN.—[On the growth and shedding of the horns of the Antelope.]

The Antelope and Deer of America, pp. 25-35, figs. 1 and 2.

A very comprehensive account of the growth and shedding of the horns, including the histologic structure, which is illustrated.

1877. WILLISTON, S. W.—The American Antelope.

American Naturalist, XI, pp. 599-603.

Remarks that the weight of evidence is strongly in favor of the annual shedding of the horns, but he is not ready to affirm it.

1878. ENDLICH, F. M.—"General Notes."

American Naturalist, XII, p. 557.

Thinks that Antelopes do shed their horns, but only at irregular intervals.

1880. FORBES, W. A.—Exhibition of drawings of the horns of the Prongbuck, and remarks upon the shedding of the horns of this animal.

Proc. Zool. Soc. London, 1880, pp. 540-543, figs. 1-3.

Describes a horn shed October 19, and gives figures of the new horn just after the shedding and four weeks later.

1882. FORBES, W. A.—Exhibition of the horns of a Prongbuck, and remarks upon the shedding of them.

Proc. Zool. Soc. London, 1882, p. 1.

Exhibition to the Society of the horns shed by a living specimen, one November 15 and the other November 24, 1881.

1889. WARD, HENRY L.—Horns of the Prong-Buck (*Antilocapra*).

Science, XIII, pp. 70-71.

Gives a summary of the literature and adds observations of his own to demonstrate the shedding.

1905. POCKOCK, R. I.—The effects of castration on the horns of a Prongbuck (*Antilocapra americana*).

Proc. Zool. Soc. London, 1905, I, pp. 191-197, figs. 28 and 29.

Description and illustration of a remarkable specimen in which the successive horns had not been shed for at least six years. This effect was probably due to the castration of the animal.

1906. SETON, ERNEST THOMPSON.—The Prong-horned Antelope. The Prong Buck of America (*Antilocapra americana* Ord. 1818).

Scribner's Magazine, XL, pp. 33-49.

Discusses the horns on page 36, and quotes observations of Mr. W. R. McFadden showing that the horns are cast in the fall.



1907. MEARNS, EDGAR ALEXANDER.—Mammals of the Mexican Boundary of the United States.

Bull. U. S. Nat. Mus. 56, Pt. 1, pp. 224-226.

A very good and careful account of the shedding of Antelope horns as observed by Doctor Mearns on living and freshly killed wild individuals.

Plate XXV in Baird's Mammals of North America, 1857, gives many illustrations of the various shapes of the horns of the Antelope, at maturity and during the process of growth. Professor Baird was evidently not aware of the annual shedding of the horns. The interpretation of the ages and stages of growth of the horns illustrated on the plate are given in Doctor Canfield's letter published in 1866.

#### EXPLANATION OF PLATES.

##### PLATE XXXVIII.

All figures about  $\frac{2}{3}$  natural size.

FIG. 1. Right horn-core of adult female, Cat. No. 1078, from Presidio del Norte, Mexico.

2. Right horn of adult female, Cat. No. 144983, from Montana.

3. Newly formed left horn of a young adult male, Cat. No. 111702, from Medicine Hat, Alberta. Most of the horn-core is uncovered with horn. The blunt angle over which the prong was to grow is seen at the base of the horn-core.

4. Half-grown left horn of an adult male, Cat. No. 111708, from Medicine Hat, Alberta. Horn has formed for the apex of the horn and for the prong. The rest of the horn-core was presumably covered with skin. Some of this skin in the process of cornifying, together with long hairs, is seen on the horn-core above the prong.

5. Fully matured left horn of an adult male, Cat. No. 86395, from Wyoming. This horn is not typical in that the apex is twisted forward instead of backward, as is usually the case

##### PLATE XXXIX.

About  $\frac{2}{3}$  natural size.

Adult male, Cat. No. 20776, from Wyoming. The horns of this specimen are decidedly abnormal in their marked forward inclination. The horn-core as well as the horn itself is bent forward. The specimen is still further abnormal in that the old shedding horn on the left side has not been cast off but is still firmly attached to new-formed but well-developed horn beneath it.